Cover Stories:

Major Scientific Publications Featuring NRI-funded Research

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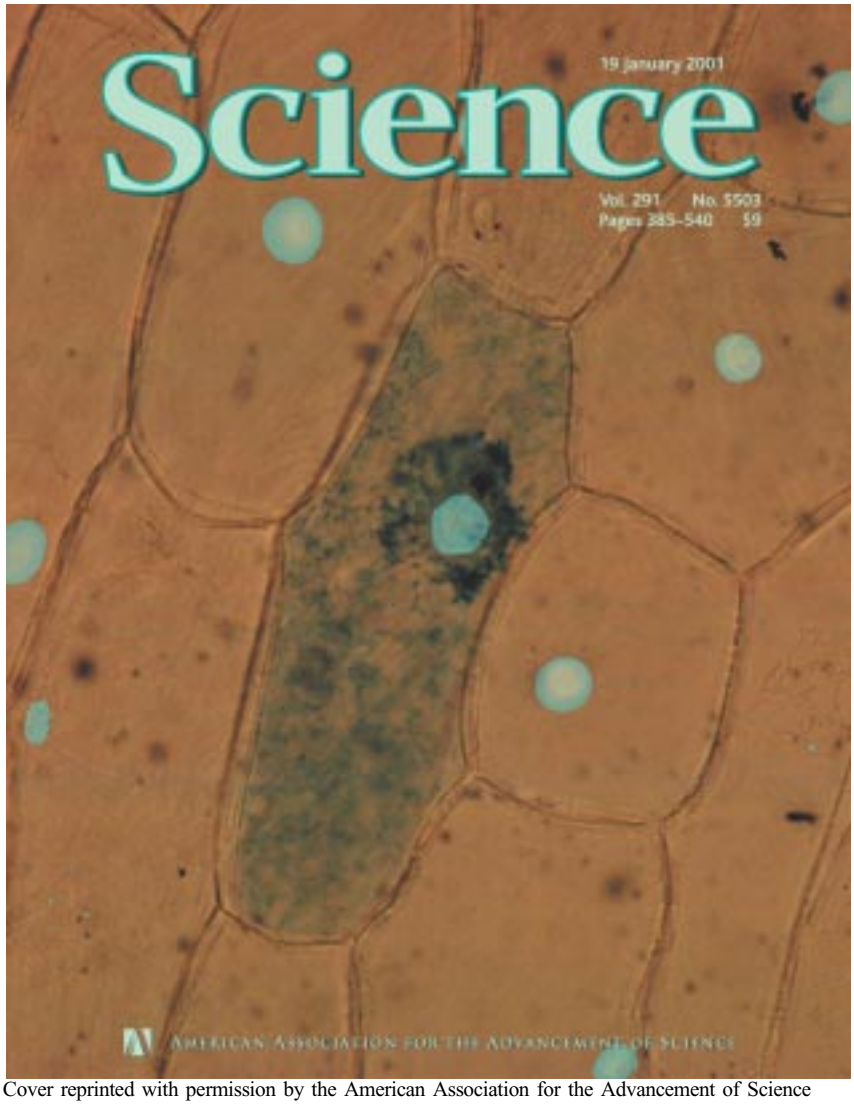

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Hongwei Guo, Todd Mockler, Hien Doung and Chentao Lin. 2001. SUB1, an Arabidopsis *Ca^{2+}-Binding Protein Involved in Cryptochrome and Phytochrome Coaction.* ***Science****. 293: 487-490.*

How plants respond to light is a biological phenomenon that is relevant to agriculture. All crops depend on sunlight for not only photosynthesis and regulation but also appropriate growth and development. It is well known that the receptors for red/far-red light (phytochromes) and blue/UV-A light (cryptochromes) mediate many similar developmental processes of plants in response to light, but the detailed molecular mechanisms are still unclear.

In work supported by USDA-NRI, Chentao Lin of UCLA and colleagues discovered a new *Arabidopsis* gene (SUB1) that is involved in how light signals are transmitted from the photoreceptor. They found that a mutation in the SUB1 gene caused altered light responses mediated by both phytochrome A and cryptochromes. SUB1 was found to encode a calcium-binding protein, providing the first genetic evidence for the involvement of calcium in cryptochrome signaling. In contrast to other photoreceptor signaling molecules identified so far, which are located in either the cytosol or the nucleus, these researchers have discovered SUB1 in the nuclear periphery of the cell. This research has demonstrated a molecular linkage between the two different types of photoreceptors, and also a linkage between light signaling components located in the two major compartments (cytosol and nucleus) of a cell. This finding will lead to further understanding of photoreceptor signal transduction. Improved understanding of the light signal transduction mechanism will help us understand how plants grow under different light conditions, which will ultimately result in increased agricultural productivity and efficiency.

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